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Can the Gas Industry Manufacture an Over Supply of By-Products?

How Welfare of Gas Industry Is Linked Up With Dyestuffs Industry and Pharmaceutical Industry—Wherein the Mere Ability on the Part of These to Monopolize the Home Market Will Not Suffice for the Gas Industry's Well-Being; They Must Export

By L. W. ALWYN-SCHMIDT

The war has created an enormous demand for many of the basic products made from coal. As the result a great number of industries only loosely connected with their manufacture have entered this industry and during the last few years there has been a very considerable increase in the supply of coal products. The question is now, whether the by-product industry has not grown so rapidly as to outgrow the demand and whether in a short while we shall not experience a slump in the demand for these commodities. Such a slump would be a serious matter for the gas industry as it would cut it off from a source of income which has been thought inexhaustible and which promises to be the financial mainstay of the gas industry outside gas making proper.

The problem is one which deserves the closest attention of all those engaged in gas making and a correct solution of it must influence the policy of the American gas industry during the next few years. Shall the industry continue to increase its by-product plants? And, if it should be decided to do so, in what direction must the industry proceed to secure itself against the eventuality of a slump?

The Prospects of the American Dyestuff Industry

It is not always easy to gain a clear impression of the future of any particular industry, especially if there is so little to go by as in the case of our new by-product industry. This industry has its two principal customers now from the dyestuff industry and the pharmaceutical industry, both industrial branches that are comparatively new to the American economic life, for the products of which, however, there is a very steady demand at the present time. Every industry making a basic product or an intermediate is vitally interested in the well-being of its customers. It is, therefore, not surprising that the gas industry should follow closely the development of the two industries with a view to get acquainted with their commercial possibilities.

The American dyestuff industry has made very rapid progress during the last few years. From an industry practically foreign to our own country it has grown into a very important branch of industrial activity and it is estimated that approximately $100,000,000 has been invested in this industry alone. The American dyestuff industry has had for a number of years the American field practically for itself, and in this time it has found leisure to perfect its processes and build itself up. The results have been good and the industry to-day is as sound as it can be. But it is not quite clear yet whether it will continue to expand. This is the unknown factor in the present situation, upon which the gas industry has to gamble as far as the dyestuff industry is concerned. The writer has made a careful investigation of the chances of this industry. It has shown that the American dyestuff industry is now able to produce a great many dyes at the same quality as the imported dyes, but it is still behind as to the supply of the so-called vat dyes, and in that of certain special shades which have not been much in demand during recent years and which cannot be manufactured in sufficient quantity as to make possible their production under the present conditions in the American dyestuff industry. It is now proposed to remedy these conditions by creating machinery which will enable dyestuff manufacturers to make a better use of all their resources and will bring the industry upon approximately the same level as the German dyestuff industry before the war. As far as the American market is concerned the American dyestuff industry seems to be fairly safe. But the American market is comparatively limited in capacity. It could not support the American dyestuff industry as constituted to-day, neither would its possession justify the American gas industry to build upon

it a vast scheme of industrial expansion in the by-product field. True, the capacity of the American market is bound to grow with the growth of the American textile industry. The growth of the American textile industry and all the other industries consuming dyes, however, depends now largely upon the ability of the American industry to enter foreign markets. The fate of the dyestuff industry, therefore, is closely interlinked with the future of American foreign commerce.

The same applies to the pharmaceutical industry. This industry has been like the dye industry, practically entirely in the hands of foreign interests before the war. Since the last five years, however, American enterprise has taken hold of this very important branch of industrial production and inside a short time a very powerful industry has grown up that is now second to none in the world. This industry is now reaching out for foreign markets. It finds itself hindered, however, in this attempt by the existence of special privileges and patents in the hands of other countries, which it will be difficult to overcome. The expansion of the American pharmaceutical industry outside the United States, therefore, most likely will proceed much slower than that of the dye industry.

Exports Essential

The dyestuff industry has been very successful with the export of synthetic indigo and there is no reason to believe that the export demand will confine itself to this article alone. In fact, nearly all American dyestuffs are exported already in limited quantities. The future development of that trade depends largely upon the competitive ability of the industry. If the American dyestuff industry can manufacture cheaply enough so as to outbid the European dyestuff and pharmaceutical industries, then there is no doubt that it will finally secure a permanent foothold abroad. Whether it will do so depends practically entirely upon the cost of manufacture in this country. We must not overlook here that the by-product industry has not grown only in the United States, but that a similar development has taken place in Europe and that, therefore, the European chemical industry is just as well supplied with intermediates and bases as the American. Can we make our basic materials and intermediates cheaper than the European industry? This is a question for the gas works to answer. There cannot be any inducement to the gas works to take up the manufacture of by-products unless it can make and sell them at a profit. Otherwise the industry would be exactly there where it started. An economic selection will take place right in our own market. The dyestuff industry and all the other consumers of by-products of coal will be compelled to buy their by-products in the cheapest market. If the gas industry is the cheapest source it will get the business; if it should prove more expensive than its competitors it is bound to lose out.

The problem as far as the gas industry is concerned, therefore, concentrates itself upon the point of competitive manufacture.

No Actual Oversupply Expected

We must take it for granted at first that there cannot be any real oversupply of by-products, meaning those products that can be sold at the right price. On the other hand we may imagine very easily a situation, where a number of gas works would turn out a large supply of products at a cost very much above that which can be paid by the dyestuff industry. The dyestuff industry would then be unable to supply its dyes cheaply enough in order to compete successfully in the foreign markets, and its turnover would decline. In turn we would have a decline in the demand of by-products and a decrease in cost which would make it unprofitable for the gas works to make by-products. Considering the large amounts of money which have been spent already in by-product plants this would be a very serious situation for the gas industry.

It is now up to the gas industry to provide beforehand for such an eventuality. Its mere existence should prove a warning to the directors of gas enterprises to study carefully their market before they invest heavily in the manufacture of any given by-product.

Let us suppose that the present supply of the by-products of coal which are used for pharmaceutical purposes and dye making has reached its limit. We would then have to expect only a further increase in the demand of approximately 15 per cent every year that should prove sufficient to cover the needs of the nation both for home and foreign consumption. The risk to enter such a market would be already fairly large for any but the largest enterprises. This point is not reached yet. There is still room for a great many by-product plants. But the danger point may be reached very soon if the present ratio of building increases. Such a development is not new to the economic history of the world. It has taken place often in our own market and has been experienced similarly in the old world. In every case it has ended with the victory of the large enterprises while the smaller ones had either to give up or were bought out by the large firms.

In our own country such an occurrence would have to be regretted exceedingly. But it may very well be guarded against by those most likely to suffer. There is no need for our smaller gas plants to engage in the construction of expensive by-product plants for the manufacture of products for which there exists already extensive competition. They will and should find employment for their surplus energies in the making of such by-products that are of minor or local importance and which, therefore, are also not subject so much to the influence of competition.

Lack of Knowledge of Governing Facts

The situation as depicted here shows how little we really still know about the properties of the by-product of the coal gas industry and how little also has been done to develop this knowledge. Here has been in existence a large and very important industry burning up annually an enormous quantity of coal and knowing very well that it discharged a large part of its values into the air; and no attempt has been made to remedy the situation. It required a war and the economic disorganization of the whole world to remind us of that fact, and even after such a cataclysm we are not further ahead than following the beaten tracks of the European industry. For the student of economics there cannot be any doubt that the range of by-products of coal and the employment to which those by-products can be put has not come to its limits, but that we are on the threshhold of extensive discoveries

if only we are ready to proceed to a proper study of the whole problem.

The writer sees it to-day as follows: The great importance of the gas industry as a source of by-products for the use of other industries is generally acknowledged, but this source can be put to profitable use only in the case of the large gas enterprises which are conveniently located for the distribution of their respective products. The smaller gas plants cannot expect in future to compete successfully in the market and they will be cut off from that possibility entirely if a material reduction should take place in the market price of these products. The usefulness of the by-product of the gas industry has not ended with the present known products, and the smaller gas plants especially can be made of enormous value for the supply of certain products to be used in their immediate neighborhood. In the exploitation of these possibilities, in fact, the importance of the by-product for the smaller gas enterprise lies.

What Can the Gas Industry Do to Develop These Dormant Possibilities?

It must, no doubt, first agree to the facts themselves, because realization of the situation is required for any attempt to correct them successfully. The problem then should not be approached from its natural aspects, but from that of the small gas enterprises exclusively. These firms might combine inside the national association into a committee to take up the proposition and study it more carefully than can be done by the whole body. It will then show immediately that the interests of these smaller plants will vary considerably from those of the larger enterprises, a fact which is easily explained by the difference of their financial standing, their resources in equipment and sales possibilities. After the facts have been established the problem should be laid before a number of industrial, economic and chemical experts not necessarily connected with the gas industry. They should be asked what, in their opinion, might be done by the gas works to make themselves useful to their neighborhood as the producers of one or the other by-product of coal, what form this product should take, and how it might be manufactured most economically by a plant of limited size.

All forthcoming suggestions should be carefully investigated. As the industry knows already what it requires it will be easy to reject the unsuitable and retain the suitable for further development. Coal is a natural product of peculiar qualities. It contains the essentials of heat, of color, of health. It assists in the growth of plant life, but may also destroy it. There should be unexpected possibilities in the waste products of coal, and there must be a great many forms of those products which can be easily manufactured and turned to the daily use of any community. Not every small town has dyeworks, but there is hardly one that has not agriculture. Fertilizer, therefore, seems to be one form in which the by-products might be used. If a chemical composition can be produced with the help of coal that is healthful to the body, why should there not be any possibility of employing the same products externally in the form of butter, for instance?

Also have we really come to the end of the consumption possibilities of the more generally known by-products of gas? Is toluol used to its fullest extent? Are there means of employing by-products in direct manufacture by the gas works themselves? No exhaustive answer has yet been given to these inquiries.

But whatever will be finally the solution of the problem it must follow certain fundamental directions. The present development of the by-product industry is not broad enough in order to permit its fullest utilization by the gas works, large or small. The market for the known by-products is limited in scope, and, therefore, is not free of danger for the small producer.

To make by-product making useful for the whole industry we must add to the number of the products that can be made by increasing their adaptability and by introducing products that can be manufactured as successfully by the smaller enterprise as by the larger.

The effect of such development upon the American gas industry will be very considerable. It will make it possible for many gas works to enter the production of by-products which are now detained from doing so because they find the proceeding too risky. It will make the financial investment more secure. It will give a new importance to the gas work in its own community. In addition it will give a new interest in their work to gas men themselves. The possibility of adding to the activities of the industry will attract many a first-class man to the gas industry, and with these new men new ideas will come.

It seems there is sufficient cause to make worth while such a study of the by-product situation, and the earlier it is taken up the better will be the chances of bringing it to a successful conclusion.

Calorific Value of Coke and Coke Breeze

A comparison of various cokes in respect to their relative calorific values is readily effected by a determination of their content of volatile matter and of ash on a dry basis. The fixed carbon content is calculated by difference. The calorific value is then equal to 146.7 C + 200 V B.t.u. per lb. on dry basis, where C represents the percentage of fixed carbon and V the percentage of volatile matter (both on a dry basis) in the sample. A graph is given by the use of which the calorific value of all cokes within the range, ash content up to 20 per cent volatile matter up to 15 per cent, and fixed carbon from 80 up to 100 per cent can be ascertained (*Gas World*, 1919, 71, 165).

Gas Values of Peat

According to experiments quoted in *Gas and Oil Power*, one ton of peat containing 50 or even 60 per cent of moisture, if the later producer gas plants are used, contains about 20,000 cu. ft. of high grade illuminating gas with 160 B.t.u. per cu. ft. or 40,000 cu. ft. of medium grade heating or power gases with 130 B.t.u. per cu. ft. or 80,000 cu. ft. of low grade heating or power gas at about 100 to 110 B.t.u. per cu. ft. This latter grade of gas is the most economical per heat unit for steel works. Besides, the following by-products are obtained by retorting one ton of peat: 800 lb. coke, 100 lb. ammonium sulphate, 40 lb. crude oil, 16 lb. paraffin, 4 to 8 lb. pitch and 5 lb. creosote benzol, alcohol, toluol and antiseptics.

Pulverized Coal and Its Future

Pulverizing Improves Combustible Quality of Coal, and Permits More Complete Mixture of Particles with the Air, Obtaining Perfect Combustion with Low Percentage of Excess Air

All grades of coal can be burned in pulverized form and all grades of commercial coal can be burned with high efficiency regardless of the percentage of ash. There is no interference with the combustion action by the increase or reduction in the percentage of ash of any ordinary coal that would be used. This advantage which is obtained by the use of pulverized coal is certainly attractive for it means a wonderful extension in the natural fuel resources of this country, according to H. G. Barnhurst, chief engineer of the Fuller Engineering Company, as a result of his research work with pulverized coal, in a paper delivered before the Philadelphia section of the American Society of Mechanical Engineers and reprinted in a recent issue of the *Journal of the Engineers Club of Philadelphia*. Mr. Barnhurst gives the causes of the earlier unsuccessful application of pulverized coal; conditions necessary for the practical application and operation with this fuel and its advantages over other fuels.

Remarkable strides have been made recently in the adoption of pulverized coal as a fuel for stationary boilers, and this development is now attracting considerable attention. For a long while the difficulties encountered in the earlier applications were of such a nature as to prevent very much enthusiasm being aroused in relation to this method of burning coal. The earlier attempts to burn pulverized coal under stationary boilers were not successful, as sufficient knowledge of the subject was lacking. Pulverized coal was burned in boiler furnaces, but with destructive results to the refractories, because the fuel, being in suspension and in nearly a gaseous condition, was being burned in furnaces designed for other methods of firing.

In the earlier days coal was not pulverized to the present standard degree of fineness and also it was not dried as carefully as was necessary. Furthermore, it was introduced into the furnace using pressures that were too high, with a resulting blow-pipe effect which created local zones of high velocity gases in the furnace, against the refractories, causing an erosive action to take place with a destructive result.

Conditions Requisite for Successful Use of Pulverized Coal

It was not thoroughly understood that there was a certain relation necessary between the volume of the combustion chamber and the quantity of fuel fired per unit of time. All of the conditions necessary for successful and practical operation are now thoroughly understood. The many continued attempts that were made gradually brought light to the subject and it later developed that the basic reason causing destructive conditions in the furnace was contracted volume and excessive velocities of the gases of combustion passing through the furnace. However, any furnace is not properly proportioned when the velocity of the gases is so high that deterioration of the refractory lining occurs, regardless of the method of firing. Further, this condition being thoroughly understood, it is now possible to design and construct combustion chambers under boilers suitable for burning pulverized coal.

It has been found by actual experience that the maximum velocity that can be maintained without destruction is 7 ft. per second. This, stated in terms of boiler horsepower developed, would equal approximately 2 cu. ft. of furnace volume per boiler horsepower developed, assuming that the combustion chamber was nearly in the form of a cube. This is a general statement as to the furnace proportions required for firing pulverized bituminous coal in stationary boilers.

As boiler furnaces, however, are not always in the form of a cube, the limiting feature would be the velocity of the gases through the smallest cross-sectional area and where the highest temperatures prevail. Firebrick become plastic below the melting point, yet they will retain their shape unless subjected to undue pressure and high velocities of the gases, when subjected to temperatures ordinarily required for high combined efficiency. Absolute control of furnace temperatures prevents to a great extent refractory troubles and consequently reduces furnace maintenance.

Advantages of Pulverized Coal as a Fuel

The principal reason for pulverizing coal is to make it burn more easily. Combustion is continuous, and the main argument in advocating the use of pulverized coal is that pulverizing improves the combustible quality of the coal. Pulverizing permits of a more complete mixture of the particles with the air, so that complete and practically perfect combustion is obtained with a low percentage of excess air. When coal is pulverized to the standard degree of fineness—that is, 95 per cent through the 100-mesh sieve and 85 per cent through the 200-mesh sieve—its surface exposure is increased between seven and eight hundred times and the number of particles in a cubic inch of pulverized coal of this fineness is somewhere between 500,000,000 and a billion. The particles contained in one cubic inch of pulverized coal, if arranged touching side by side, would extend more than six miles. It can be readily seen, therefore, that the subdivision of the particles of combustible is so great that they exceed even that possible of attainment by the use of oil in the present oil burners. and therefore higher efficiencies are possible, due to the better mixing of the fuel with the air, than can be expected by burning fuel of any other kind, excepting, possibly, natural gas, or by using any other method of burning coal.

The furnace contents previously specified refer to the use of pulverized bituminous coal in stationary boilers. The same general rule holds good for all high volatile coals or coals in which at least 25 per cent of the total combustible is volatile matter. Where other fuels are concerned, such as anthracite or coke breeze or any other grades of low volatile fuels, the furnace must be designed to suit these fuels. Where low volatile coals are burned it is necessary to locate the burners

through which the fuel is introduced to the furnace at a point sufficiently close to the flow of the products of combustion on their way to the boiler, in order to assist the initial ignition of the fuel by a regenerative action in the furnace, and this action can only be obtained by the return flame approaching near the jets of fuel entering the furnace.

Low-Grade Coals Can Be Used

The pulverizing method has opened up and made useful wide fields of low-grade coals hitherto not available due to their peculiar nature. Among these might be mentioned lignite coals, graphitic anthracite coals of Rhode Island, and also various kinds of waste fuels from mining operations.

It is also well to point out the ability of the pulverizing equipment to handle coals of any grade regardless of the quality, so that it is not necessary for any power house using pulverized coal as a fuel to depend upon any particular kind, quality or size of fuel to obtain high economy in its operation. This is necessary at present and an actual requirement in many cases in order to obtain high efficiencies with the stoker equipment.

There is practically a complete elimination of standby losses where pulverized coal is used. If the firing operation ceases the doors are closed. No air is allowed to pass through the furnace and the radiant heat of the furnace is absorbed by the boiler, whereas with grates or stokers air must be permitted to pass through the furnace, and there is a loss of combustible in the ash, a constant burning up of fuel, and a loss due to incomplete combustion of the gases generated from banked fires on the grates.

There are no metallic parts exposed to the action of the heat and interfering with continuous operation in pulverized coal burning. There are no fuel beds or clinkers to interfere with the air supply. The arguments, therefore, in favor of pulverized coal method of firing appear very strong.

Cost of Preparation

The adoption of this method of firing, however, for any particular installation, depends strictly upon the cost of preparation. The cost of preparation varies greatly with the quantity of fuel burned daily and it is strictly a question of the profit in sight as to which equipment will show the greatest returns on the investment for any plant of a given capacity.

In order to give a general idea of the cost of pulverizing coal and delivering it to the boilers, some assumptions will have to be made. The following cost of pulverizing is made of a number of items as follows: Power, repairs, drier fuel and labor.

The first two items are nearly constant. The drier fuel will vary slightly, according to the price at which coal is received. The cost of labor diminishes as the quantity of coal increases. In the following table the power is assumed as costing three-quarter of a cent per kilowatt hour. The repairs at 7 cents per net ton. The drier fuel is based on coal at $5 per net ton delivered with an average moisture content of 7 per cent, assuming that 6 per cent of moisture would be driven off per pound of coal in the drier. The furnace labor is assumed at 50 cents per hour.

Cost of Pulverizing and Delivering the Pulverized Fuel to Boiler Furnaces

Daily Capacity in Tons	Cost of Labor	Number Labor Hours	Repairs	Drier Fuel	Power	Cost of Pulverizing
20	30c	12	7c	6c	13	56c
30	30c	18	7c	6c	13	56c
40	25c	22	7c	6c	13	51c
80	20c	32	7c	6c	13	46c
120	18c	42	7c	6c	13	44c
160	17c	48	7c	6c	13	43c
240	13c	62	7c	6c	13	39c
320	11c	72	7c	6c	13	37c
400	10c	83	7c	6c	13	36c
480	9.5c	94	7c	6c	13	35.5c
640	8c	104	7c	6c	13	34c
800	6.75c	108	7c	6c	13	32.75c
960	6c	114	7c	6c	13	32c
1120	5c	116	7c	6c	13	31c

No interest, depreciation, insurance or taxes have been included in the above total.

The cost of pulverizing shown above should not be considered as an additional expense in the preparation of the coal in pulverized form, when comparing the total cost of handling fuel with the best stoker fired practice, because the handling of coal in stoker installations, which includes the crushing and handling of the coal to the stokers, the cost of supplying the power for driving the crushing, elevating and conveying equipment, stokers and fans for air supply, together with the repairs on the entire equipment, amounts to from 30 to 60 cents per ton coal fired, depending upon the size of the plant.

Method of Preparation

To prepare the fuel properly it should first be thoroughly dried. The moisture content should ordinarily be brought down to 1 per cent, with the exception of lignite coals, which can be readily pulverized when carrying a higher percentage. This drying is facilitated by a preliminary crushing of the coal, so that the drying may be rapid and effective. This dry coal is then ground to dust in a mill capable of delivering the required quantity and of such fineness that 85 per cent at least will pass through screens of 200 meshes to the inch.

The coal when properly prepared is then transported by any one of a number of satisfactory methods to suit the conditions to the point of use at the boiler furnace. It is then delivered to the burners at the furnace by means of feed controllers regulating the quantity of fuel fed per minute. All of the air possible for combustion should enter the boiler furnace with the coal at the burners which are designed to regulate the air supply. This is necessary in order to obtain the best possible mixture as well as instantaneous combustion and complete consumption of the fuel particles before reaching the heating surface of the boiler. Positive control must also be available over all of the excess air permitted to enter the furnace. No combustion air can possibly mix with the coal particles satisfactorily in the furnace or after the coal and air mixture has entered the furnace.

Consumption of Pulverized Coal

From 12,000,000 to 15,000,000 tons of pulverized coal are being used annually in the United States to-day, and there are over 250 pulverized coal plants in successful operation. No serious accidents can take place during the pulverizing operation or handling if proper equipment is installed. It might be well to state that there are being used annually in the United States to-day, and now by boiler explosions as there have been killed during the entire history of the use of pulverized coal, or since pulverized coal was first adopted as a new method of burning coal. The requirements necessary for safe operation are too well understood to cause any doubt in the minds of any one contemplating the use of pulverized coal. A few simple rules are all that are necessary to govern the operation, and if followed out absolute safety is assured.

Coal can be pulverized and burned satisfactorily and the equipment will give a reliability equal to the best methods of firing boilers. There are to-day many plants in existence, including power houses and heating stations, which at times are loaded up to capacity and in which type of plants reliability is of the first consideration, that have now been in operation over a period of time sufficient to eliminate any chance of doubt so far as the question of reliability of operation is concerned.

There are at present, as mentioned above, many plants in successful operation supplying pulverized coal to furnaces of all kinds where it is essential to have continuous operation without interruption, which plants are giving satisfactory service in every particular. Boilers have now been in continuous operation for over three years, twenty-four hours' service. The question of furnace refractories having been satisfactorily overcome, there appears to be no reason why pulverized coal shall not take its place as one of the standard methods of firing and one in which the possibilities of obtaining high efficiencies is certain.

Ash Dissipation

The question of ash dissipation is one of importance, for the dissipation of ash from any type of furnace is a serious condition and should be prevented or diminished wherever possible. There is no combustible or soot, coke or large particles of ash that can possibly be discharged from a pulverized coal-fired furnace. There are power houses to-day operating right in the center of large cities and surrounded on all sides by high buildings. No complaints have been made, although some of these plants have been operating over twenty months. There also is no evidence around the plant that would indicate that the ash descends in such quantities as to be noticeable in the vicinity of the power plant. When fineness to which the coal is pulverized is taken into consideration, the combustible having been burned out, it is extremely doubtful as to whether particles that would not settle before passing up through the stack would descend anywhere in the vicinity of the plant. As mentioned, the disposal of ash has not been a serious question. Some ash settles in the furnace in the form of dust, some between the second and third pass as a sort of coarse sand, and the balance passes to the atmosphere.

Smokeless Furnace Operation

Smokeless furnace operation requires that the gases must be distilled from the coal at a uniform rate; also, that when these gases are distilled they must be brought in with intimate mixture with sufficient hot air to burn them completely. Pulverized coal is, therefore, in the best possible condition to satisfy these requirements. High volatile coals can also be burned satisfactorily and without smoke in pulverized form.

The investment required in pulverized coal plant and burning equipment is comparable to that of a first-class stoker equipment in small and medium-sized plants, but in the larger plants the pulverizing equipment complete is considerably less expensive than the stoker equipment.

The pulverized coal age is here to stay, for this method of firing represents the first step taken towards burning coal in a scientific manner. It seems needless, therefore, to reiterate that with the advantages apparent by burning coal in this form, its ultimate adoption as a standard method of firing in larger installations is only a question of time.

Low-Pressure Turbines in Forges for Utilization of Exhaust Steam

Great savings are possible by utilizing exhaust steam from hammers instead of allowing it to escape into the atmosphere. Low-pressure turbines are well adapted for the utilization of exhaust steam from a drop forging plant where steam hammers are present, because nearly as much heat is available in the expansion of one pound of steam from atmospheric pressure down to a vacuum of 28 in. of mercury, as in the expansion from a pressure 125 lb. absolute—a very common pressure for steam hammers—down to atmospheric pressure. The first step in the utilization is to provide means for collecting all the exhaust steam from the hammers. Part of the exhaust is generally used in feed water heaters or other boiler auxiliaries, or for heating shops, etc., and in such cases the hammers generally exhaust into a common header. An exhaust turbine may be connected to the header of sufficient diameter to keep the pressure drop within reasonable limits. Atmospheric release valves in the exhaust line open only when the exhaust steam supply becomes greater than is required by the turbine. A constant pressure valve is fitted between the header and the turbine in order to maintain uniform back pressure on the hammers, and also to prevent the pressure in the exhaust header falling below atmospheric since this condition would lead to air being drawn in through leaky flanges and passing through the turbine into the condenser, thus reducing the turbine efficiency.

Use of Peat

The use of peat instead of coal has been carried out to a large extent in Austria and Hungary. In Hungary, 2,000 peat beds have been recognized, and in Sweden 18 per cent of the coal used has been replaced by peat. Wood and peat have been used to the extent of 120,000 tons per annum, but it has been expected that the peat beds will yield 4,000,000 tons per annum, replacing 180,000 tons of coal. In Denmark, mixtures of coal and peat have been successfully used in locomotives.

Manufactured Gas to Supply the Heat for the Extraction of Oil from Shale

Twenty-Two Billion Barrels of Oil a Possibility of the Process — Estimates of Production Cost Show Possibility of Shale Oil Competing with Gasoline at Its Lowest Previous Level

By H. J. GIFFORD

To the artificial gas industry of America will be given the greater part of the credit for the exploitation and development of the shale oil production in the United States, which in the opinions of those interested and controlling this comparatively new extractive industry, is destined to become America's leading means for substitution of oils and petroleum products now obtained from Mexican fields.

Shale oil can be produced at a cost that will yield a considerable profit to the producer and enable him to sell at a figure that would be competitive with quotations on cheap Mexican oil.

There is no questioning the fact in the minds of the projectors of the Wallace process that shale oil can be extracted at a much cheaper cost than petroleum can be in the United States.

The gas business will be the working basis of the shale oil production.

In the Aug. 30 issue of GAS ENGINEERING JOURNAL, there was an article on this subject, explaining in a semi-technical manner the operation of a new improved still perfected by George W. Wallace, superintendent of the St. Clair County Gas & Electric Company of Illinois. Since then activities of the Ute Oil Company of Missouri, Utah and Arizona, for which Mr. Wallace is consulting engineer, have progressed to such a stage that gas men, irrespective of their immediate pursuits, should be interested in some of the following:

The Ute Oil Company was incorporated in Arizona in 1916 with a capital of $1,000,000. Later charters were obtained to do business in Missouri and Utah. The following men, representing somewhat varied lines of industry, are the officers: Jacob J. Koenigsmark, president Koenigsmark Mills, of Waterloo, Ill., president; S. P. Barron, of St. Louis, vice-president and general manager of the American Asphalt Association, vice-president; W. O. Bartholomew, of St. Louis, second vice-president; A. K. Koenigsmark, of Waterloo, Ill., secretary and treasurer; Hector McRae, of St. Louis, managing director of the Ute Oil Properties, managing director; L. G. Skirlis, of New York and Salt Lake City, chairman of the board.

H. U. Tebbe, Henry Becker and A. M. Frumberg, all of St. Louis, constitute the board of directors of the company. C. M. Curry, of Watson, Utah, is field manager; I. Grettum, E. M., is shale plant superintendent; George W. Wallace, superintendent St. Clair Gas & Electric Company, and W. E. Griffiths, of Pittsburgh, are the consulting engineers; A. M. Frumberg and William M. Bradley, of Salt Lake City, are counsels, and the Russell Engineering Company of St. Louis is the construction engineer for the erection of the new extraction plants in the Western fields.

OPERATIONS STARTED

The company has begun operations on the erection of the series of plants for shale oil extraction, the first one being started at Debeque, Col., where the shale fields are exceedingly rich. H. W. Beattly and F. D. Beattly, who own a great portion of the shale fields there, will be interested in the operation of the plant in a financial way. This plant will be used for the sole purpose of shale extraction, and will use the products of the producing plant which will be constructed there immediately. The extraction building will house the equipment and machinery for the process which has been perfected by Mr. Wallace.

The process, in brief, consists of breaking the shale in a still, which renders the product fit for the extraction process. Heat and pressure, obtained from application of artificial gas, is applied to the still.

Burners are located at the bottom and at both sides of the still, which in the opinion of the inventor, renders a more aggressive heating power.

A condensing cabinet connecting with the heated still is used to condense the gases given off by the heating of the shale. The primary gas is decomposed into two kinds of gases, one having a low vaporization point, and the other having a high vaporization point. The low vaporizing gases are condensed by means of water coils through which they pass. All of the equipment is made air, gas and moisture tight.

Mr. Wallace, who is also president of the Wallace Coke, Oil & By-Product Company, which has patented and reserved the rights on the Wallace coking and extraction process, has been hailed by many as the revolutionizer of the Illinois coal coking industry, because of the great economical savings effected through the use of this process and because of the benefits this process will bring to Western coke consuming industries.

ALMOST UNLIMITED POSSIBILITIES FOR DEVELOPMENT

Twenty-two billion barrels of oil can be produced from the lands now in possession of the company, it has been estimated. According to official reports by experts on the shale oil research and investigation bureaus, the Bureaus of Mines and Metallurgy, and other interests, the shale oil extraction industry is in its infancy and there are almost unlimited possibilities for its development.

Even in some of the States east of the discovered shale fields, there is some soapstone, in some cases, less oil and pure gas content, but there is room for other development.

If the fields that contain the shale are worked, ex-

perts say, there is sufficient oil in the United States to supply the demands of oil consumers here and perhaps take care of outside needs. This would mean that oils that are now being imported from Mexico would be replaced by a much higher grade of oil and at a cheaper cost.

It was because of the gas used in the retort system that enabled the inventor to place on the market for industrial uses the first practical coke manufactured from Western coals, as gas was the most economical fuel, producing maximum heating and pressing power at minimum cost. And now it is gas that has enabled the inventor to not only produce a good quality oil at a cheaper price to kill foreign competition, but to enable the country to develop a new industry.

The following report on the shale oil extraction and on the Wallace process are self explanatory:

"Report on Shale Lands of Ute Oil Company in Uinta County, Utah," made by Dr. David T. Day, consulting engineer of Washington, D. C.:

"About five years' ago the United States Geological Survey called attention to the existence of oil shales in Colorado, West of Denver and the Rio Grande Railroad, and in Eastern Utah. Going farther than this, the Geological Survey's experts spent several years in the examination of these shale lands and found: (1), that the supply of oil shales is very great, and that they are richer than the shales found in Scotland which have been worked very successfully for sixty years, and (2), that the facilities for mining the shale are also better than in Scotland. (3) They determined that the oil in such shales is richer than the Scotch and more easily mined than the Scotch, aggregates MORE THAN EIGHT TIMES ALL THE OIL AVAILABLE FROM THE OIL FIELDS OF THE UNITED STATES! Attention was also called to the existence of many other shale fields in the United States, especially in Utah, Wyoming and Nevada.

"I have visited personally all of these fields repeatedly, made a comparative study of them, and I have found that the oil shales in Utah are, in general, richer than in any area of similar size, in so far as they have been tested up to this time. This fact is also evident from the reports of the U. S. Geological Survey.

Comparison of Shales of Ute Company with Those of the Same Region

"The object of my visit to the Watson fields was to examine the lands of the Ute Oil Company and to compare the quality and quantity of shale contained in these lands with the other shales of the Watson region.

"For this purpose I first visited Section No. 6 on the north side of the White River. I found that the shales on that section can be easily inspected at the clear exposure in the cliff on the north side of the river. Shales are in evidence in layers of varying richness from the wagon road at the top of the cliff to the river bed. The obvious result of this inspection is that the proportion of the rich shales to the lean shales is much greater than in the neighborhood of Watson, that is, where shales with the richness of 40 to 60 gallons of oil per ton are usually four to ten feet in the neighborhood of Watson, the corresponding shales of Section No. 6 where the Ute Oil Company's plant will be located, are far thicker, reaching probably 40 feet of rich shale.

"The stratification of the rocks in this region shows that the shales have a very low dip to the north and each bed is even in texture, so what is true of one section can be inferred to be practically true of the entire tract.

"It is recommended that a further test of the richness of the unexposed shales should be made by doing assessment work on each claim in the following way: Make a core drill on each section until the bottom of the shale bearing series is reached, probably a depth of 300 feet. Analysis of each layer of shale encountered should be made.

"In regard to the development of the property it is recommended that a retort should be erected now on the available high ground above the maximum height of the river in front of Section No. 6, and that, beginning at the top, each layer of shale should be loosened up by black powder and blasted up with dynamite and then treated by the retort system. By this means, the whole face can be given examination on a commercial basis, and rational determination made as to whether any of the shales can be excluded from the retort.

"I definitely recommend this property as the best point in the entire Western country for the development of a shale plant, for it is evident that a much better water supply can be furnished in the locality than can be furnished at any other place, and it is also evident that there is no obstacle to the freighting of all necessary supplies to the locality in question, even before the proposed extension of the railroad to the property."

The following data may give a general idea of the estimates of cost and profit to be derived from the property at this point:

Maximum cost of mining, per ton	$0.60
Crushing and delivery to retort	0.06
Retorting	0.20
Extraction and crystallization of ammonia	0.10
Distillation of gasoline	0.02
Separation of paraffine wax	0.04
Total cost at crude oil stage, per ton	$1.02

Products Obtainable per Ton of Shale

Permanent gas in excess of that required for process	.....
Gasoline, eight gallons	$1.00
Heavy oil, thirty gallons	1.50
Paraffine wax, fifty pounds	5.00
Ammonium sulphate, twenty pounds	2.00
Total value of crude products	$9.50
Total cost of production at this stage	$1.02
Profit on crude products	$8.48

Value of products if packing plant included:

Gasoline, twenty-five gallons	$4.50
Paraffine wax, fifty pounds	5.00
Heavy oil, ten gallons	.50
Ammonia, twenty pounds	2.00
Total value	$12.00
Total cost, including cracking	1.42
Profit on products, including cracking	$10.58

(*Continued on page* 11.)

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As the Journal Views It

Out of the Groove

The days of peace, isolated contentments, are definitely of the past for the gas company executive. What more definitely and decidedly emphasizes the fact than the leading article in this week's issue.

There was a day when his problems began and ended at his district's borders. Of course, generally, his coal and oil came from outside, but coal and oil were plenty—he didn't have to go seeking them; ingratiating salesmen came by dozens willing to bring them.

If the local manager had a private ambition for broad enlightenment, of course, he had to read beyond his local daily or weekly newspaper, but for his business he need no more extensive key to the times than this provided.

Nowadays his rates are determined by State commissions—that means in itself a vastly extended and by no means entertaining quest for enlightenment. His coal quite frequently has had to be located in Washington. More ins and outs he had to learn about.

And on top of it all he must learn the intricacies of world commerce. Upon the chances of other industries being able to compete in foreign markets, depend to no small extent the very economic existence of his company.

In other words, the time has come when the gas manager must of necessity be a very broad gauged and informed man. The office isn't by any means a semi-retirement from active affairs. It is an engrossing, energy-taxing job in which only the strong, the able and the fit can expect to endure.

Enable the Salesman to Speak the Truth

No gas company to-day wants its salesmen to sell on a lie. None wants them to promise more than they can deliver.

But too frequently abstract scientists harangue notions into salesmen's heads that, practically applied, are the extreme of falsity.

A gas company salesman sought to convert one of those fossils who still close off the gas at the beginning of cold weather and bring into commission the time honored coal range and water back.

Friend fossil was one of those who didn't mind the dust and dirt of coal and ashes, the labor of bringing up the coal and down the ashes. He rather set a value on the latter—sifted, he thought them good for the garden and the residue for filling in the holes that develop in the yard.

Even with his pet argument waved aside our salesman persisted. He pointed out the saving in money.

Our fossil happened to be one of those statistically minded individuals who keeps tabs on what everything is costing him. He *knew* that he was spending thirty cents a day in coal for his range which heated as much hot water as he wanted, did all his cooking and heated his kitchen, as well as supplied an appreciable percentage to the warming of the whole house.

The gas salesman smiled.

"If it took nine dollars' worth of gas to do all that for you," he declared confidently, "you'd kick your head off."

"No, I wouldn't," disputed the prospect quietly; "because all through the summer I was paying more than ten dollars a month to do my cooking and heat the water."

"Oh, well, of course, if you are going to be careless and wasteful in its use."

"That is the point," the fossil snapped. "The gas bill I would run up if I was operating things personally is quite a different matter than what my gas bill actually is. I can get all the conveniences out of the gas that it has in it and run a bill of less than eight dollars a month, but what I can do and what I can get my cook to do do not jibe at all. She is wasteful with the coal, just as she is with the gas, but at a certain point her wastefulness with the coal reacts to her own discomfort and there it stops. No, I think I'll keep on burning the coal."

The salesman left disgusted, but not enlightened. He had confined his promises to what he was confident he could prove. Yet the customer demonstrated to him that his promises were false in his case at least. And so, undoubtedly, they would be with others.

We must concern ourselves with the cooks. It lies within their hands to put to naught all our most cherished findings. Cooks *can* waste gas comfortably with greater ease than they can coal. Gas companies should find some way to flatter or lead them to a sense of pride in gas conservation or to supply data and educate the employer as to how much gas should be a liberal quantity for his uses.

Still Stepping Carefully

Sometimes American Gas Association appointments seem slow in coming, but when they do come they almost startle in the intelligence of selection that is is manifested.

The appointment of Charles W. Person as secretary of the Advertising Section seems true to American Gas Association precedent.

This is a unique job. If its occupant cannot play up to the popular mind he is useless. But at the same time American Gas Association publicity cannot be merely an avalanche of superlatives.

The man who supervises its preparation must be sufficiently specialized not to regard anything an everything that savors of the technical with fearsome awe and as something to be handled with tongs and at a distance. There is nothing about the gas business that cannot be clearly and interestingly explained to anyone with the itch to know about things, and that is the case of the majority of those who read.

We are not acquainted with Mr. Person, but his experience record seems uniquely fitted to equip him for his new task.

We wish him well, and are willing to hazard a guess on the basis of what he has done, that he will do well.

Purification of Coal Gas

According to a patent from the Berlin-Anhaltische Maschinenbau, tar and liquor to the extent of about 75 per cent are removed from the coal gas by means of a tar-washing apparatus. A fine spray of water is then directed into the gas, and in this way the remaining tar is removed. The water may be readily separated from the mixture of tar and water produced, and may be again passed through the injector, where lignite is used, the gas may be readily freed from dust and tar and can be used, thereafter, for gas engines.

Gas Meter for Registering Heat Units

In preparation of the sale of gas by heat units, says *Gas World*, George A. Wilson, Coventry, England, has produced a meter that will record both heat units and cubic feet. The meter has an additional index geared to the ordinary mechanism and this can be adjusted for various qualities of gas by fixing different dials graduated according to British thermal units contained in the gas. The dial is fixed on by two screws from the outside of the meter with an adjustable pointer, thus allowing it to be adapted for any quality of gas without interferring with the mechanism or necessitating the opening of the meter. The adjustable pointer can, if so desired, be set back to zero after each meter reading. The dial is enclosed with a hinged bezel and glass end arranbements for sealing. The heat unit register is adaptable to any kind of meter.

Manufactured Gas to Supply Heat for the Extraction of Oil from Shale

(*Continued from page 8.*)

In regard to the process of retorting for coal and shale as used by Mr. Wallace, the art of heating coals and shales is divisible into two branches: (1) High temperature processes, having as their purpose the improvement of coal as regards smoke or the production of a high grade coke, or such treatment of shale as will give the maximum amount of ammonia. Such processes reach a temperature of about 1,300 deg. Fahr., and (2), low temperature processes. These have for their purpose the extraction of the maximum amount of oil from coals or shales with a minimum amount of permanent gas. With coals, the main object is to improve the quality of the coal by rendering it smokeless, but to leave sufficient volatile matter to enable it to burn with a flame. In general the greatest gain over high temperature processes is the production of more oil by avoiding cracking part of the oil to permanent gas. The temperature of these low distillation retorts varies from 600 to 1,000 deg. Fahr.

Careful examinations of the Wallace process for extraction, which is a great improvement over the process invented some time ago and to which is due the practicalization of the extraction process for commercial uses of oil, reveals several points that, although they are in operation at the present time only in his small retort laboratory, they will without a doubt be applicable to uses on a greater scale.

The Walace process belongs to the low temperature class. In it the temperature is kept as constantly as possible at 1,000 deg. Fahr. The essential features of the Wallace retort are:

How the Distillation Is Made

A vertical cast iron retort, 9 ft. 8 in. high, with a circular section about 40 in. in diameter. Within this retort is a cast iron tube with many perforations. The tube is closed at the top. Between the tube and the walls of the retort the coal or shale to be treated is introduced from the top and heated to about 1,000 deg. Fahr. The only avenue of escape for the resulting gases is through the perforations of the inner tube, or duct, from which the vapors are led off to condensing apparatus under slightly diminished pressure. The essential advantage in the apparatus consists in extracting all oil vapors after they have traveled the minimum distance through the heated mass. In no case do they come in contact with the heated material for a distance greater than 10 in. As a result the extraction of the oils from coals or shales is accomplished with great rapidity, in fact, in about one-sixth consumed by the usual Scotch retort methods, and with uniformly greater yield of oil per ton of coal or shale. Again the quality of the oil is more nearly that of the original material contained in the shale, that is, it has not been injured by cracking to any great extent.

While most of the shale retorts, both of the low and the high temperature classes, are arranged to work continuously, this system is designed for discontinous operation. Upon first examination, this might seem a manifest disadvantage. But considering the plans for large shale operations, it is obvious that this feature was due to intelligent and careful designing on the part of the inventor, and is one of the chief features of the process.

Results of Test

The first test run by the Wallace retort process, recently, resulted in the following:

Nine pounds of shale were charged into the small retort and after heating fifteen minutes 135 cu. cm. of oil were drawn off from the condensor reservoir. The amount of oil formed in each fifteen minutes thereafter was taken according to this table:

Minutes.	Quantity of Oil.
15	135 c.cm.
30	230 c.cm.
45	240 c.cm.
60	80 c.cm.
75	10 c.cm.
90	65 c.cm.
	760 c.cm.

Total permanent gas, 11 cu. ft.; weight of residue, 6½ lb.; total oil, per ton, 45 gal.; total gas per ton, 2,400 cu. ft. No attempt was made to return the ammonia produced. Examination of the oil produced showed it to be lighter in color and containing markedly less unsaturated hydrocarbons than in oil obtained by Scotch and other successful processes.

Average results obtained from the testing of ten different composite samples of oil shale from Uinta Basin, representing data secured from approximately sixty different runs on the oil:

Oil recovered per ton of shale charged after one hour's distillation:

	Gals.
Crude oil	51.5
Gasoline scrubbed from fixed gases	3.1
Total oil and gasoline	54.6

	Per Cent.
Residue	75.0
Volatile matter	25.0
Oils Recovered	20.0
Gases	5.0

Results obtained from retorting shale until all volatile products have been removed:

Total oil and gasoline recovery	56.5 gallons
Residue	75.0 per cent
Volatile matter	25.0 per cent
Oils	20.6 per cent
Gases	4.4 per cent

Distillation test of average sample of oil:

Start, 149 deg. Fahr.	65 c.cm.
10 per cent, 240 deg. Fahr.	116 c.cm.
20 per cent, 400 deg. Fahr.	205 c.cm.
30 per cent, 470 deg. Fahr.	244 c.cm.
40 per cent, 537 deg. Fahr.	281 c.cm.
50 per cent, 610 deg. Fahr.	320 c.cm.
60 per cent, 650 deg. Fahr.	345 c.cm.
70 per cent, 680 deg. Fahr.	360 c.cm.

80 per cent, 710 deg. Fahr.	378 c.cm.
90 per cent, 715 deg. Fahr.	380 c.cm.
96.8 per cent, 717 deg. Fahr.	381 c.cm.

The foregoing analysis shows that this oil will refine over 20 per cent gasoline; that the initial and final boiling point will be lower than that of the average gasoline refined from petroleum. Tests show that this oil contains more than 6 per cent paraffine, and that 96.8 per cent of the crude oil can be refined into finished products. After extracting the gasoline and the paraffine, the balance of the oil can be either refined into high grade lubricating oils, gas oils and burning oils, or the burning and gas oils and burning oils converted into gasoline by cracking. From 60 to 80 per cent of the kerosene and gas oil can be cracked and converted into gasoline, making the total recovery of gasoline 38 per cent of oil extracted from the shale.

Gross income per ton of shale, based on 50 gal. oil recovery:

Gasoline, 38 per cent; 19 gals. at 25 cents	$4.75
Lubricating, 37 per cent; 18.5 gals. at 10 cents	1.85
Paraffine, 7 per cent; 25 lb. at 10 cents	2.50
Minimum gross income	$9.10

Cost of producing oil from one ton of shale:

Mining, crushing and delivering shale to retort	$0.50
Cost of retorting (labor, fuel, repairs, etc.)	.60
Total cost of refining (cracking and paraffine included)	.60
Extraction and crystallization, 10 bls. ammonium	.20
Total	$1.90
Gross income	$9.10
Refining and retorting costs	1.90
Profit	$7.20

This margin of profit permits crude petroleum to drop to its lowest previous level and still leaves a good margin in refining shale.

Practically Every Individual Has a Financial Interest in the Public Utility Industry

"About $15,000,000,000 capital, representing a considerable part of all the savings of the people of the country, are invested in public utilities," said O. B. Wilcox, addressing the convention of investment bankers at St. Louis. "The securities representing these savings are held by thousands of investors, large and small, and by nearly every bank and financial institution of the country, and in endowment funds of churches, colleges, schools, hospitals, and in other trust funds. The integrity of these investments is of direct or indirect consequence to every citizen; and the maintenance of the service and the expansion of the time and money and labor-saving devices of public utilities is incalculably important to every man or woman with an industrial interest in the country whether as investor, employer or wage earner."

Use of Calcium Chloride to Prevent Freezing in Fire Apparatus

Where water barrels, pails, or hand pump extinguishers are located in rooms subject to freezing temperatures, use calcium chloride to lower the freezing point of their contents. The following table shows the temperatures at which water will freeze when calcium is added in the proportions shown:

Lbs. of Calcium Chloride per Gal. of Water	Temperature of Freezing Deg. Fahr.	Degrees Salometer	Degrees Baume
½	29	13	3
1	27	27	6
1¼	25	36	9
1½	23	40	10
1¾	21	44	11
2	18	52	13
2¼	14	62	15
2½	3—4	80	20
3	—1—4	88	22
3½	—8—11	95	24
4	—17—19	104	26
4½	—27—29	112	28
5	—39—41	120	30
5½	—50—54	124	32

Calcium chloride is recommended in place of common salt because the latter will always rust metals and may become objectionable by reason of its tendency to "creep" and crystallize all over the receptacle. In emergencies when calcium chloride is not immediately obtainable, salt may be substituted as follows:

Use one pound of salt to 18 gallons of water. Add four ounces of salt to this solution for every degree Fahrenheit below 30. One gallon of water weighs 8.35 pounds.

Another table has been expressed as follows:

Pounds of Salt per Gallon	Freezing Point, Deg. Fahr.
½	24 above zero
1	18 above zero
1¼	15 above zero
1½	12 above zero
1¾	9 above zero
2	6 above zero
2¼	3 above zero
2½	1 above zero
3	3 below zero
3½	8 below zero

This solution should be mixed in a vat before being placed in barrels, care being exercised to see that the salt is entirely dissolved. If dumped into a barrel and covered with water, or if thrown into a barrel of water, the salt will be only partially dissolved and unsatisfactory results obtained. Barrels with wooden hoops should be used, as salt will corrode steel hoops or steel tanks.

At 3½ lbs. per gallon the solution becomes saturated and further addition of salt is useless. Salt and water solutions will freeze at temperatures below 18 deg. Fahr. and must not be used where lower temperatures will be encountered.

Using the Movie Program for Advertising

By ERNEST A. DEUCH

It is most discouraging to pick up any motion picture program if one expects to find the local advertising announcements of the attractive kind. Now and then some advertiser goes one better than his neighbor and he is rewarded by his announcement standing out conspicuously from the rest. Considering that movie program advertising, like almost everything else, costs more since 1914, the gas company is penny wise and pound foolish when it fails to offset this additional cost by making its advertising more efficient.

The Movie Star Comparison

If you wish to run a picture in your advertisement without the expense of having the cut made, ask the movie exhibitor or the local newspaper editor to furnish you with a cut of some prominent photoplay star for which he has no further use. The film manufacturers supply these free or at actual cost, so most exhibitors generally have a morgue for their used cuts. Insert the cut in the middle of the program announcement and weave around it the following advertisement:

> "In the movies personality and ability makes the star. The gas company that stars is the one which gives its patrons prompt, courteous service, has a complete line of gas appliances and sells at right prices. This description applies to the Blank Gas Company."

If you have not the time to change the copy in every issue, insert a cut of another player. This will answer the purpose for the time being.

The Photo Supplement

Another effective way by which to use cuts of movie stars obtained from the exhibitor without cost is by having a page supplement inserted in the movie program. This should be printed on enameled paper, as the cut selected for newspaper reproduction would be too blurry for the purpose. Devote the front page to the cut and at the bottom add a brief description of the star, where born, her career and so forth. The exhibitor will help you out in this connection. On the back page should appear this little notice: "With the compliments of Blank Gas Company, 48 Main Street."

The exhibitor will charge you little more than the actual printing cost of the supplement since it is an asset to his program. The fans will place the supplement in their albums and pin it on their bedroom walls, so that they will always have something to remember your gas company by.

The Ideal Program Make-Up

How does the exhibitor arrange his program? Does he have several pages of editorials, program announcements and movie gossip, placing the advertisements on the last two pages? If so, this make-up works to your disadvantage. Not every reader is going out of his way to peruse the advertisements, and if you make it hard for him in this connection, he will surely skip your announcement. The ideal form of make-up—and that favored by the national advertiser—is mingling the text with the advertising matter. If you and your fellow advertisers bring sufficient pressure to bear on the exhibitor he will have no alternative but to effect the desired reform. It is just as easy for him to spread the advertising along with the reading matter as it is for him to separate the advertising from the reading matter. It means a lot of difference in the results you obtain.

The Camouflaged Advertisement

Even better than the advertisement appearing alongside the reading matter is the advertisement masquerading as reading matter. The advertisement of this nature should attract attention, not repel. It must be interesting enough to counteract the "I have been fooled" feeling on the part of the reader. One example of the right kind of "reader" advertisement is the fake "Answers and Correspondent's" column:

"Alice—No, Blank's Gas Company has never appeared in the movies. Someday we hope to induce a film company to visit Brownsville and if we succeed we hope you will be around for the filming. Many movie fans purchase our gas appliances, so why not take the hint?"

"Bill—Sorry, we don't know of any movie star who claims Brownsville as his home town. We do claim, however, that Blank's is the company that 'STARS' in this town."

It is exceedingly probable that the exhibitor will make a slight additional charge for such announcements, but it will be worth it if you fill the space up with stuff along the lines of the examples given.

The Film Border

For a new and attractive border for your advertisement ask your exhibitor to give you a strip of film a few inches long. Have a cut made of the film the same size as the space you generally use and use the border in every issue of the program. By doing this your advertisement will be decidedly distinctive and will rivet the reader's attention.

A Movie Mailing List

It is a big mistake to insert a cou-

pon or request that your advertisement be clipped out because the fans like to keep their programs intact. If you have to have tangible proof of where the fan came across your advertisement request the reader to copy the advertisement and bring it with him. What will get him, if the former plan fails, is the war tax inducement. Add this to your usual announcement: "Your time is worth money. Clip this ad, add your name and address, present it at the box office when paying for admission and your tax will be paid."

Aside from the additional business this stunt will bring, it will supply you with names and addresses for your mailing list at the cost of one or two cents apiece. It will be wise from time to time to offer free tickets and movie souvenirs to your motion picture clientele. Keep this portion of your mailing list distinct from the other portion so that you can single it out occasionally for special attention. Such a mailing list will be worth its weight in gold.

Modesto Gas Company Rates Raised 8 Per Cent

An 8 per cent increase in the cost of gas to the consumers of the Modesto (Cal.) Gas Company has been authorized by the State Railroad Commission.

Increased cost of labor and materials were cited as reasons for the raise.

The new rates, the commission estimated in valuing the plant at $230,000, will yield a net income of $18,282 refreshments.

$10,000,000 Company Being Organized to Supply Northern Texas Cities

Plans are on foot to provide Dallas, Fort Worth and other cities and towns of North Texas with a natural gas supply, in addition to that now afforded by the Lone Star Gas Company.

E. W. Hartman and associates, who own large producing acreage in the gas field of western Louisiana are organizing a company of $10,000,000 capital stock which will lay pipe lines to those cities and towns in the northern part of Texas. The right of way for the trunk pipe line has been obtained. It is proposed by the new company to supply gas to domestic consumers at not more than 25 cents per 1,000 cu. ft., according to Mr. Hartman.

Peterson Shows in His Advertising Campaign How Much Cheaper Gas Is To-Day Than Five Years Ago

By S. G. ADDISON

"Do you know," said Peterson to the artist who draws his advertising illustrations, "that I believe that we people who advertise are having something to do with the present labor unrest. We have featured the high cost and the increasing cost of living to an unhealthy extent. We should give more attention to the low cost of living."

"But I don't find the cost of living low," countered the artist. "Do you?"

"No, I have never found the cost of living low. Never has there been a time when I found the least difficulty in finding ways to spend all the money that I could earn. What has always bothered me has been to keep my expenses down to a point where there would be left a certain percentage of my income for savings. It is just as hard to save now as it was when I was getting only nine dollars a week, but, after all, I don't find it much harder to save now than it was back in 1914. This talk about the high cost of living gives us fellows on salaries which have not increased at the rate that carpenters' and steel workers' wages have, an excuse for economizing. I will have to admit, however, that if things go on much longer as they are going now, and I cannot increase my income at a greater rate than I have during the past four years, that it is going to be hard to make both ends meet. What I propose to do, however, is to start a campaign to show the working people that they are far better off to-day than they were five years ago."

"How do you propose to do it?"

"To make my plan perfectly clear to you I think I had better tell you my idea of what money really is. To my mind money is nothing but a credit slip which the laborer can exchange for the product of the labor of other people. When I receive my salary check, I do not care how much or how little its value is in dollars and cents as long as I can exchange it for all the commodities and the services that I desire. It is the exchange value that really counts. I want more money to-day than I did five years ago, primarily because the dollar is not worth as much, will not buy as much in labor and materials as it did five years ago. It is a decided mistake to talk about the high cost of living merely because our dollars go no farther than they do."

"I don't think that I quite get your idea. I have been thinking that the only reason why we should talk about the high cost of living is because our dollars do not go so far. Everything I buy either for my business or my home costs a great deal more than it did five years ago. You can't get labor of any kind, either skilled or unskilled for the same price that you did a few years ago."

"You are making more money to-day than you did five years ago. Are you not?"

"Yes, but it is not because I am charging so much more than I did then. I have learned how to run my business more economically. I am practising every economy that it is possible to practice in my office. If I did not do so, I would not be able to show enough profit to meet all of my living expenses."

"You have hit the point. Labor is getting higher wages than it ever got before, but commodities and services have not gone up in the same proportion. You are able to render the service you do at the price you do because you have instituted economies in your business. We are able to sell gas at the price that we do because we have instituted economies in our business. The chewing gum people are able to sell chewing gum at the prices they do because they have instituted economies in their business. In none of these cases have the prices to the consumer increased at the rate at which the earnings of those consumers have increased except in the cases of a few people who have absolutely fixed incomes."

"It seems to me," drawled the artist, "that you are trying to make out that the increased cost of living has been a mighty good thing. In fact, that the cost of living is not as great as it was five years ago and that the efficiency of conducting business has been very greatly increased."

"That is about it," agreed Peterson. "In the case of wage earners it does not cost as much to live today as it did five years ago and this is due to the fact that business is

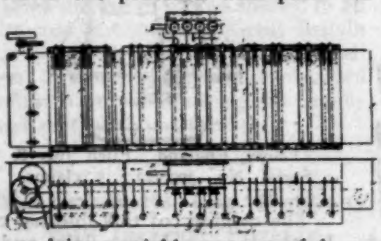
(*Continued on page* 20.)

PATENTS PERTINENT TO GAS INDUSTRY

Gas Oven or Furnace

Patent No. 1,323,041; described in Patent Office *Gazette*, Nov. 25, 1919, page 670. John Gallimore and Daniel Cook, Edinburgh, Scotland. Filed Jan. 10, 1917. Serial No. 141,656. 5 Claims. (Cl. 158—115.)

In this gas oven or furnace there is a plurality of burners and a plurality of groups of valves. These valves are provided with ports for

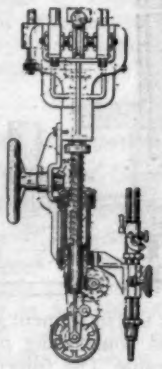


supplying variable groups of burners. There are index plates which indicate the number of burners that are turned on or off. There is also a means for automatically lighting the burners, and the lighting means is provided with a valve which prevents the operation of the burner valves before the lighting valve has been operated.

Machine for Cutting by Means of Gases

Patent No. 1,324,006; described in Patent Office *Gazette*, Dec. 2, 1919, page 147. Worthy C. Bucknam, Jersey City, N. J., assignor to Davis-Bournonville Company, New York, N. Y., a corporation of New York. Filed Dec. 31, 1918. Serial No. 269,090. 10 Claims. (Cl. 266—23.)

This machine effects cutting for all purposes and conditions by means of gases. The central portion of the machine is standard, or stationary. On one side, swinging from the standard, there is a projecting arm which turns on a pivot. On the other side of the standard, below the center, there is a depending structure which is carried by the projecting arm, and it is carried in such a manner that it can move freely in and out relatively to the standard as well as laterally. This depending structure has a vertical swivel, and the swivel carries a feed wheel which allows the swivel to turn upon its point of rolling contact on the work. Geared to the feed wheel is a means for driving.



This driving means conforms to the swiveling movement. Adjacent to the feed wheel, but independent of its swiveling movement, there is a torch supported on the dependent structure.

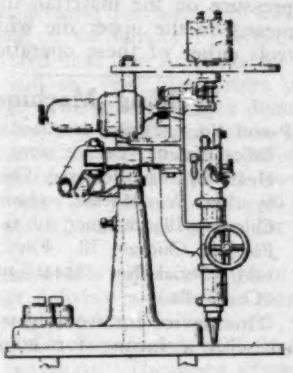
Manufacture of Toluene

Patent No. 1,324,143; described in Patent Office *Gazette*, Dec. 9, page 217. Benjamin T. Brooks, Pittsburgh, Pa., assignor, mesne assignments, to E. I. du Pont de Nemours & Co., Wilmington, Del., a corporation of Delaware. Filed June 10, 1915. Serial No. 33,263. 12 Claims. (Cl. 23—24.)

The process of the manufacture of toluene consists of the reaction upon a combination of a boiling aromatic hydrocarbon with a material which effects a chemical change. The vapors formed from this process of distilling toluene are condensed and benzene is obtained. This benzene is then added to another charge of a high boiling aromatic hydrocarbon resulting in a reaction, obtained by the use of a catalytic material, to effect the chemical change, which forms toluene.

Gas Cutting Machine

Patent No. 1,324,007; described in Patent Office *Gazette*, Dec. 2, 1919, page 148. Worthy C. Bucknam, Jersey City, N. J., assignor to Davis-Bournonville Company, New York, N. Y., a corporation



of New York. Filed Feb. 19, 1919. Serial No. 278,040. 10 Claims. (Cl. 266—23)

This gas cutting machine is built on a support which bears the weight of the machine itself. The structure, or frame, supported is jointed for movement in all directions in a plane. This frame carries a torch, and a stationary guide, or templet. A wheel on the frame, in axial alignment with the torch, propels the torch. This wheel and the templet operate together.

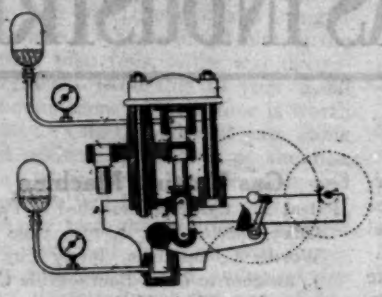
Briquetting Press

Patent No. 1,322,960; described in Patent Office *Gazette*, November 25, 1919, page 655. Wilhelm Schumacher, Osnabruck, Germany, assignor to General Briquetting Company, New York, N. Y., a corporation of Maine. Filed Dec. 2, 1912, Serial No. 134,442. Renewed Dec. 16, 1916, Serial No. 137,443. 2 claims. (Cl. 25—72.)

This briquetting press has an upper die, with a mold beneath it, which is movable into exact registry with the upper die. The mold has a movable sleeve within it. There

is a lower die, which also has a means for moving it.

When a predetermined pressure upon the material under compression in the upper die has been exceeded,

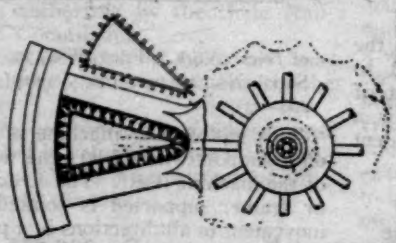


or, when it is desired to increase the pressure on the material, there is a means on the upper die which controls either of these operations.

Welding Machine

Patent No. 1,323,485; described in Patent Office *Gazette*, Dec. 2, 1919, page 49. Henry Mueller, deceased, Chicago, Ill., by Ida W. Mueller, administratrix, Chicago, Ill., assignor to George H. Forsyth, Chicago, Ill. Filed April 2, 1915. Serial No. 18,744. 10 Claims. (Cl. 78—82.)

This device for welding is provided with a means for holding the



abutting surfaces to be welded in contact, on an extended line. The burner for welding is so arranged to direct its flame simultaneously upon the edges, throughout their length, to be welded. There is also a means to supply fuel to the burner.

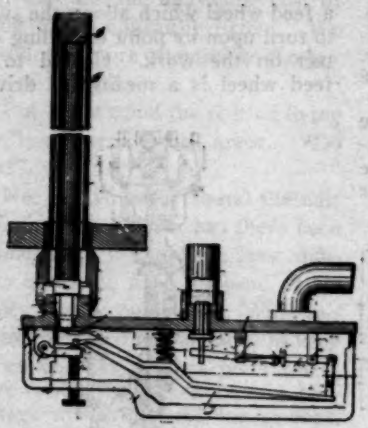
Martinsville Company Applies for Financing

The Martinsville (Ind.) Gas & Electric Company has filed a petition with the Public Service Commission of Indiana, asking permission to issue notes to the value of $40,000 to take up outstanding indebtedness of $38,500, due the coming year, which debt, as is set forth in the petition, was contracted in the operation of its business. The notes are to draw 7 per cent and become due beginning Dec. 1, 1920 and up to Dec. 1, 1928. They are in 3,000, 4,000 and 5,000 amounts.

Expanding and Contracting Element of Thermostatic Valve Put to Use

Patent No. 1,324,070; described in Patent Office *Gazette*, Dec. 9, 1919, page 203. Gerhardt F. Schwartz, St. Louis, Mo. Filed Aug. 26, 1918. Serial No. 251,567. 7 claims. (Cl. 236—48.)

A hinge supports the fulcrum point of a lever, holding the lever in place

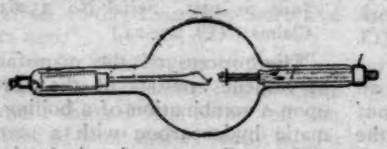


against the movement of the expanding and contracting of the thermostatic valve. The fulcrum point slides lengthwise about the hinge, raising and lowering the lever up and down. This effects the opening and closing operation of the valve.

Apparatus for Removing Gases

Patent No. 1,323,836; described in Patent Office *Gazette*, Dec. 2, 1919, page 115. William D. Coolidge, Schenectady, N. Y., assignor to General Electric Company, a corporation of New York. Filed Oct. 6, 1916. Serial No. 124,186. 6 claims. (Cl. 250—35.)

Heating metallic thorium to its reaction temperature in the space of a

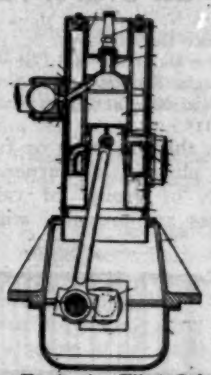


cathode is the method used in this instance for removing common gases from any device having a cathode of refractory material adapted to be operated at white heat.

SOUTHERN CALIFORNIA GAS COMPANY has applied to the Railroad Commission for the authority to issue $300,000 of its first mortgage, 6 per cent bonds to reimburse the company for the cost of additions, betterments and extensions made to the plant.

Internal Combustion Engine Has Port Which Simultaneously Controls Piston and Water Cooling Jacket

Patent No. 1,324,159; described in Patent Office *Gazette*, Dec. 9, 1919, page 220. Alfred James Junge, Kingston-upon-

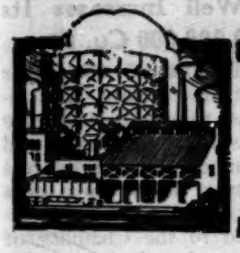


Thames, England. Filed July 8, 1919. Serial No. 309,523. 5 claims. (Cl. 60—32.)

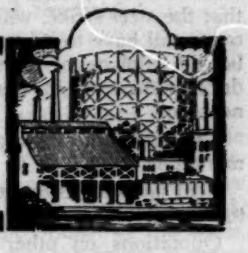
The cylinder of this internal combustion engine, having inlet and exhaust ports, is equipped with a means of supporting it from its end. Surrounding the cylinder is a water cooling chamber, or jacket. The water cooling jacket has a controlling port outside of it, which also controls the piston at the same time.

J. L. Richards Says That Subsidiaries Earned Surplus Over Dividend

President J. L. Richards, of the Massachusetts Gas Companies states that conclusions based on the earnings reports of the subsidiary companies to the effect that the 7 per cent common dividend will not be earned for the 1919 year are erroneous. "The 7 per cent dividend referred to will not only be earned, but I believe that there will be a substantial surplus for the period mentioned after paying said dividend," he says. Furthermore, the earnings of subsidiaries as published monthly are not subject to deductions for depreciation and reserves, including taxes, "as amounts have not only been charged to expenses each month for reserves, but also for taxes believed to be sufficient to pay same when due."



NEWS OF THE GAS INDUSTRY



Alcohol from Coke for Motor Fuel

A recent report from Middlesborough, England, states that a local engineer of that city has succeeded in extracting commercial alcohol and its derivatives from coke. It is claimed that if the process which requires the use of gas, is applied to all the coal carbonized in Great Britain an estimated yield of 50,000,000 gallons of motor spirits will be obtained annually, revolutionizing the supply and cost of liquid fuel.

Massachusetts Gas Company Will Increase Foreign Trade

Articles of incorporation have been applied for at the State House, incorporating under the laws of Massachusetts, the Beacon Coal & Export Corporation. The Massachusetts Gas Companies will own 45 per cent of the stock of this new organization; 45 per cent of the same will be owned by other large coal operators, and the balance of 10 per cent by bankers, who, it is expected, will be of material help in connection with foreign credits.

The officers of the new company will consist of: A. W. Calloway, president (now president of the Pittsburgh Terminal & Railroad Company, Davis Coal & Coke Company, and several other coal companies); Robert Grant, first vice-president (now president of the New England Fuel & Transportation Company); Edward Page, second vice-president (now vice-president of the New England Coal & Coke Company); E. M. Richards, treasurer (now treasurer of Massachusetts Gas Companies). The directors will be: A. M. Calloway, Arthur Stewart, Robert Grant, Charles S. Sargent, Jr., James L. Richards, Edward Page and E. M. Richards.

The object of the Massachusetts Gas Companies going into this new enterprise is not only to do more direct the foreign business that they are already engaged in, but also to largely increase their foreign trade. Mr. Page, the vice-president, and Mr. Lyons, secretary of the New England Coal & Coke Company, sailed on the *Mauretania* from New York, Dec. 30, in connection with this new enterprise.

Ohio Cities Company Will Increase Preferred Stock from $10,000,000 to $90,000,000

Directors of the Ohio Cities Gas Company have decided to increase the company's preferred stock from $10,000,000 to $90,000,000. Stockholders will vote on the action Jan. 29. The additional stock will be issued from time to time for the purpose of financing the future development of the company.

Announcement was made that the directors intend to set aside the first $10,000,000 of preferred for exchange share for share for present outstanding 5 per cent preferred. This issue will bear a 6 per cent dividend rate, as the management believes the original owners of the preferred to whom much of the company's development is due are entitled to this consideration. When this old stock is exchanged it will be cancelled, leaving authorized the preferred issue of $80,000,000.

A. G. A. Urges Companies to Prevent Diversion of Gas Coals

Gas Companies all over the country have been urged by the American Gas Association to take prompt steps locally to prevent diversion of gas coals. Officials of the association added that the Railroad Administration again had notified its agents that gas coal should be conserved for use of gas companies and that such coal should be so designated on mine way bills in order that it may be readily identified.

Demand for Benzol Far in Advance of Supply

High Prices Predicted for 1920—Market for the Week on Other By-Products

The demand for benzol is still in advance of the supply. Predictions are heard that the first quarter of 1920 will see very high prices prevailing. The prices on spot demand still stand at 34 cents per gallon with very little of the product offered. The price for tank cars is quoted at 25 cents per gallon for the 90 per cent and 27 cents per gallon for the pure.

Considerable supplies of toluol for prompt delivery were in the market the past week. The demand was strong and the market held firm at the quotations. The price advanced on Dec. 1 to 28 cents per gallon for the pure in tank cars; drums are quoted up to 32 cents per gallon.

There has been no change in the price of creosote oil. The 25 per cent grade is still quoted at 40 cents per gallon and the 15 per cent grade at 20 cents per gallon. Supplies, however, are considerably restricted and advances are believed to be coming.

Prices of naphtha are still at very high levels and nothing lower than 32 cents per gallon could be quoted at the close of last week. The market is better supplied with this product than it was a few weeks ago, but there are no prompt shipments offered at present, however, although the supply is better than that of benzol.

Sulphate of ammonia is practically off the market for spot delivery. The price has now reached record-breaking heights. Quotations are up to 7.15 cents a pound and the chances of securing this product under 7 cents are said to be small. It is reported that with the exception of a few tiny second hand lots, all sales now are for January and February delivery and in some cases March for f. a. s., and the amount which can be obtained under these condi-

tions is very limited. It is thought that the steel strike, which is not yet over, will have to be well in the past before sulphate of ammonia is produced sufficiently for much spot business.

Gas oil in the Chicago petroleum market is quoted at 10 cents.

Coal tar pitch is quoted at $24 per ton in car load lots.

Quotations on other by-products are as follows:

Solvent naphtha, tank cars, 22 cents; drums, 23 to 27 cents.

Cresylic acid, 95 per cent dark, in drums, 72 to 75 cents; straw color, in drums, 77 to 80 cents.

Heavy naphtha, 24 cents per gallon in drums.

Outcome of Illinois Constitutional Convention on Utility "Home Rule" Debated

What action will be taken by the Illinois constitutional convention on the question of enabling cities, villages and other municipalities to issue bonds without constitutional limitations for the acquisition of public utilities, is a much-debated question in Chicago at present.

The matter has been brought before the Chicago city council, which is expected by some to make a fight to have written into the proposed new constitution a clause granting to Chicago the inalienable right to own every public utility property.

"I think we ought to be in a position to control the rates and services of every public-serving utility, and to take over such utility if desired," said Alderman Ross A. Woodhull, leading the fight before the city council.

Ex-Governor Edward F. Dunne, in speaking before the public ownership conference recently, said the people had fully expressed themselves in favor of acquisition of "remunerative public utilities such as water works, gas works, electric light plants, etc."

The true situation, in the opinion of many men who are in position to know, is that the public is not clamoring for such ownership and operation, but that the noise is made principally for personal or political reasons, and in many cases by persons who are utterly insincere.

"Public ownership of the railroads for a few months sickened the public of such inefficiency as naturally develops," is the way one man put it.

United Natural and Clarion Companies Consolidate

Notice has been filed in Oil City, Pa., that application has been made to the Public Service Commission of the Commonwealth of Pennsylvania, under the provisions of the Public Service Company law, by the United Natural Gas Company and the Clarion Gas Company for a certificate of public convenience evidencing the commission's requisite approval of the consolidation and merger of said companies into a new corporation to be known as United Natural Gas Company.

A public hearing upon this application was held at Harrisburg, on Dec. 29.

Court Decision Rules 75-Cent Rate Valid

The validity of the 75-cent gas rate in San Francisco, fixed by the San Francisco Board of Supervisors for the fiscal years 1913 to 1916 inclusive, is upheld in a decision of H. M. Wright, master in chancery.

The amount involved, with interest, is $1,376,874, which will be refunded to San Francisco gas consumers by the Pacific Gas & Electric Company when Wright's decision becomes final. The Pacific Gas & Electric Company attacked the 75-cent rate as being confiscatory.

Through a temporary injunction, the company was allowed to collect a rate of 85 cents, giving bonds to the court certifying that if the 75-cent rate is upheld, the company would return the excess collected with 7 per cent interest.

The report of Wright covers 144 pages, and with few exceptions the testimony of N. Randall Ellis, valuation engineer for the city, was sustained. According to the report of the Master in Chancery the gas properties of the Pacific Gas & Electric Company were worth in the years involved, 1913-14, $13,976,435; 1914-15, $13,985,772; 1915-16, $14,415,674.

An excess of $20,000,000 as a rating basis for the three years involved had been asked by the gas company. It was determined by the suit that 7 per cent was a minimum fair rate of return on the company's investment, and the testimony bore out the fact, according to Lull, that the 75-cent rate yielded at least that amount.

Big Gas Well Increases Its Flow 10,000,000 Cu. Ft.

The E. R. Black 20,000,000-ft. gas well, brought in recently, has increased its flow to exceed 30,000,000 cu. ft. of gas every 24 hours, and is one of a bunch of big producers on a single tract within two miles of the city of Henryetta, Okla. Figures submitted to the Chamber of Commerce show that there is at this time upward of 400,000,000 cu. ft. of commercial gas available in this field.

Standard Company of New Jersey Granted Increased Rates

To enable the Standard Gas Company, which operates in Monmouth County, N. J., to meet losses in operation and make needed improvements in its plant, the New Jersey Public Utilities Commission has authorized the company to put into effect an increased schedule of rates beginning with the January sales.

Instead of a rate of $1.45 a 1,000 cu. ft. for the first 3,000 ft. of gas consumed during a month, the new rate will be $1.65. The petition of the company asked for a new rate of $1.85, but this was regarded as unnecessarily high by the Public Utilities Commission.

Under the new scale of prices the rate for the next 5,000 cu. ft. will be $1.45, for the next 20,000 $1.40, for the next 20,000 $1.35, for the next 25,000 $1.20, for the next 25,000 $1.15 and for all gas consumed in excess of 100,000 cu. ft. $1.10.

Testimony taken by the commission showed that during the first six months of the present year the company was operated at a loss of $13,000, as against a loss of $11,000 during the first six months of last year. Owing to lack of funds the company pleaded inability to make a number of improvements recommended by the commission, the estimated cost of which was $40,000.

Asks for Continuation of Increased Rates

An application is on file with the Illinois Public Utilities Commission for an advance of rates for gas service in Moline, Rock Island, East Moline and Silvis. The application is in effect for a continuation of gas rates as authorized by order dated May 13, last, and filed by the company.

Well in Jacksboro, Texas, Making 10,000,000 Cu. Ft.

The David Mackenzie Knox No. 1 well, two and three-quarter miles east of Jacksboro, Texas, is making 10,000,000 cu. ft. of gas. The gas sand was entered at 2,110 ft, and the hole is down to 2,160 ft. It is believed that almost any foot now will develop an oil sand. Considerable excitement exists here over this discovery.

Owing to Coal Shortage Company Postpones Rate Increase

The East Ohio Gas Company announced that the 35-cent rate would stay in effect until March 1 in the city of Akron, Ohio, in view of the present coal shortage, as the company feared increased rates would result in suffering in homes and closing of some factories. A new sliding scale ranging from 45 to 65 cents per 1,000, was to have gone into effect in November, under a new franchise recently granted.

Big Gasser at Amarillo Is Brought Under Control

After running wild for nearly two weeks, the big Masterson No. 4 gasser at Amarillo, Texas, gauging 107,000,000 ft. of gas daily, was placed under control several days ago. The well is 1,585 ft. deep and one of the largest gassers in the United States. The Empire Company is now negotiating with the city of Amarillo for a gas franchise. Gas may be piped to other cities and into adjoining States.

There are now sixty wells either just completed or drilling within a radius of 75 miles of Amarillo. Every completed well has found gas flows of from 3,000,000 cu. ft. to the Masterson's 107,000,000 ft.

The first gas well reached a depth of 2,300 ft. and produced 6,000,000 ft. of gas. This was drilled by the Amarillo Oil Company. Five other wells were then drilled in this section, all producing gas. One of these wells on the Hapgood farm is but 1,600 ft. deep and is shut in with a 12-in. casing and gate. This well is reported to have a capacity of more than 100,000,000 cu. ft., but this report has not been officially verified. These gas wells have a rock pressure of 480 pounds. Operations are extending over into New Mexico.

California Midland Counties Company Sells Plant for $388,000

Settlement of a gas company war in California and the formation of a new corporation to take over properties involved in the struggle are indicated by the announcement that the Midland Counties Public Service Corporation is to sell its natural gas equipment in Santa Barbara and San Luis Obispo Counties, Cal., to the Santa Maria Gas & Power Company for $388,000, provided the transaction meets with the approval of the Railroad Commission. An application asking for the California State Railroad Commission's O. K. has been filed. The application says that the public will be better served by the elimination of service duplications in the city of San Luis Obispo, where the companies have been in competition, and where the Midland company says it has not been operating at a reasonable profit. With the approval of the sale of the gas properties the commission is asked to authorize the collection in all the territory now served by the two companies of the rates for gas charged by the Santa Maria company.

The plan of financing the transaction submitted to the commission calls for the formation of a new corporation which is to issue bonds at 95 to the Midlands company in part payment for the properties involved. This new corporation is also to sell to the Midlands company 1,000,000 cu. ft. of natural gas or more a day at the rate of 15 cents a 1,000 cu. ft., delivery to be made at the Betteravia steam plant of the San Joaquin Light & Power Company, the amount received under this contract to be credited on a three-year note for $82,000 given by the new company in accordance with the purchase terms.

The gas manufacturing plant of the Midlands company in San Luis Obispo and its retail stores are not included in the deal. The deal does, however, include a pipe line running from the New Pennsylvania Petroleum Company's lease to the compressor plant on the Union Oil Company's Newlove lease and another line running from Betteravia Junction to the San Joaquin Light & Power Company's steam plant. Both the pipe lines are in Santa Barbara County, Cal.

Chicago Company Advance Club Organizes Technical Section

Rapid progress is being made by the Technical Section of the Advance Club, the employees' club of the Peoples Gas Light & Coke Company in Chicago. The chief object of the new section is to teach each member more about the gas industry generally. "While we may specialize along some branch of the work, we can only give the fullest measure of service by broadening our knowledge of all the different lines of work," is the way officers of the Technical Section explain its aims. The engineer operating a steam engine delivering gas to the public should know some of the chief uses of gas; the chemist should know some of the problems of the man on the street, and the salesman should know what a B.t.u. is if he is an alert salesman.

New Michigan Commission Makes Its First Rate

Orders All Gas Companies to Prepare Reports Same as Railroads for Interstate Commerce Commission

The Michigan Public Utilities Commission has issued an order in the case of the Holland Gas Works, making the net rate for gas in the city of Holland 14.5 cents per 100 cu. ft. or $1.45 per 1,000. The commission based the rate on 100 cu. ft., as it is pointed out that the majority of consumers use less than 1,000 cu. ft. of gas per month and computations can be made more easily on this basis. While the company was operating under a receiver the rate was $1.25 per 1,000. This is the first gas rate established by the utilities commission since its creation by the last legislature.

In 1912 the company could earn 7 per cent by producing gas at 86.5 cents per 1,000, but due to the increased cost of materials and operating expenses the Holland company says the present rate must be $1.45 per 1,000 in order to realize the same return on its investment. The commission values the plant at $180,000.

Every gas company in the State of Michigan has been notified to prepare for the new commission complete reports, demanding the same information the Interstate Commerce Commission requires from the railroads.

Peterson Shows in Advertising Campaign How Much Cheaper Gas Is Today than Five Years Ago

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being done more economically to-day than it was five years ago."

"I get your point, but just how are you going to show this to the public?"

"I am going to forget all about dollars and cents and am going to deal with hours of work. To make it as simple as possible let us take this example: Five years ago, as near as I can remember, the average wage for unskilled labor was $1.50 a day. I am not sure just what it is to-day. It may have gone up since yesterday, anyhow, but just to illustrate my meaning let us assume that it demands $3 a day. If five years ago we sold gas for 75 cents a 1,000 ft., an unskilled laborer could buy 2,000 ft. of it for a day's work. To make 2,000 ft. of it cost him a day's work to-day, we would have to sell it for $1.50 a 1,000 ft. You know very well that we would never have been able to persuade the public utility commission to pass favorably upon such an increase in rates. The only way that we could meet the situation was to put into operation as many economies as possible and find new ways of increasing profits. The result has been that the laborer has benefited very materially. In fact, it is due to just such things as this that makes the laborer so extravagant to-day, that makes it possible for him to buy so many things that he could not buy a few years ago, and we who sell goods have made it worse by warning him that prices are going to go higher. He doesn't want to give up any of his newly acquired luxuries. In fact, he has many things he has or is purchasing on the installment plan. He has seen to it that his money has made life more worth living for him. When we threaten to take some of this away from him by reducing wages, he comes back by threatening to strike if we do not increase wages. The sad part of the situation is that every time he strikes, he cuts down production and drives up overhead, which makes it just so much harder to keep down prices. There is a limit to the extent to which economies can be practised and I think that we have about reached that limit. There is one thing that is certain, economies will never make up for the cutting down on production that results from strikes. It is for that reason that I want you to help me carry out my idea."

"What do you want me to do?"

"First I want you to get my plan clearly in mind and then pass it on to your other clients. What I want you to do for me is to furnish me as soon as you can with some ideas for illustrations to show how much cheaper gas is in hours of work for the unskilled and the skilled wage earner than it was five years ago. I want these illustrations to serve two purposes. I want them to help sell more gas by showing how much cheaper it is to-day than it was five years ago and, if possible, I want to convey the idea that if the wage earner will produce more during the hours that he works and will work steadily every day, that what he buys will continue to require less hours of work. You see I want to show that there are other ways of cutting the cost of living other than striking for higher wages."

"You simply want rough pencil sketches of these ideas, do you? How about the figures that you want these based upon?"

"I have not yet verified the figures that I have. You see I want them to apply to this particular city of Blankville. As soon as I verify them I will give them to you, but in the meantime I would like to have you get the ideas ready and let me have them in time for the directors' meeting next week. I want to impress these directors with this idea. I feel sure that if we can show the laborer how much better off he is than he was five years ago he will be willing to work a little harder and strike a little less. It is surely time that we stopped waving the red flag of prices going still higher in his face."

"I rather think that you have the right idea after all."

"It seems to me the only way to go about it. The last five years has succeeded in convincing me that it would be far better, if it were possible to do so, to sell everything on the basis of so many hours of labor instead of so many cents or dollars and cents. Since it does not seem practical at present to do so, the next best way seems to be to call the attention of wage earners and others for that matter to the amount of commodities that their labor will buy."

New Rich Producing Gas Field in Penna

Drillers and gas experts who have inspected the new gas field in South Versailles Township, near McKeesport, Pa., have expressed the opinion that it is one of the best producing regions in the United States. In the three months since the first "strike" was made the field has produced more than $1,000,000 worth of gas.

Fitchburg Company Will Issue New Stock for Construction Work

The Fitchburg (Mass.) Gas & Electric Light Company has petitioned the Massachusetts Department of Public Utilities for approval of an issue of 6,937 additional shares of capital stock of $50 par. The new issue will be used, if approved, in payment of floating indebtedness already incurred for new construction, extensions and improvements. The directors of the company have fixed $60 per share, unless otherwise determined by the commission, as the price at which the new shares will be offered to the stockholders.

Lansing Gas Company to Go Into Bankruptcy

City Attorney Samuel H. Rhoads, of Lansing, Mich., has been notified by C. H. Geist, president of the Lansing Fuel & Gas Company, that the attorneys for the company have been instructed to prepare the petition and schedules and file proceedings in bankruptcy at once at the District Federal Court at Detroit before Judge Tuttle. This action will supersede all proceedings now pending in the Ingham Circuit Court, including the injunction suit prohibiting the gas company from violating any of the provisions of its present franchise. Lansing will also lose all control of the company, this authority passing to the court. Mr. Geist says that a temporary increase in rates will not help because of the need to reissue a million dollars' worth of bonds to pay off those which fall due in 1921 while $250,000 will be required for extensions and improvements which will now cease. The bankruptcy proceeding is the result of the election when the people refused to grant the company an extension of its franchise with stringent regulations.

Efficiency of Mixed Gases Tested

Tests of the cooking efficiency of mixed natural and artificial gas were made recently by engineers of the California State Railroad Commission and of the Board of Public Utilities, with the view to ascertaining if a reduction of the heat units is possible without hardship to domestic consumers.

L. S. Ready, chief gas and electric engineer of the California Railroad Commission, and H. Z. Osborne, chief engineer of the Board of Public Utilities, supervised the tests.

Manufactured Gas Plant Is Urged for Elmira, N. Y.

J. Russell Clarke, president and general manager of the American La-France Fire Engine Company, of Elmira, N. Y., was asked what he thought about the gas situation in the city of Elmira. Mr. Clarke said in part:

"The situation as I understand it as affecting the city's supply of natural gas at present furnished by the Potter Gas Company is briefly as follows:

"The supply of natural gas from the Potter Gas Company's own plant is being gradually, if not rapidly, exhausted. If the supply of natural gas in this city is adequately maintained or increased, it will be necessary for the Potter Gas Company to purchase natural gas from other sources, and this the Potter Gas Company is unwilling to do unless the price can be increased in this city to 38 cents. The Potter Gas Company would then have to depend largely on contracts or arrangements made with these outside sources of supply, as the gas company cannot increase its supply if it depends entirely on its own plant to do so.

"I am of the opinion that the only safe plan and one which will assure the city of Elmira a steady, ample supply of gas is to urge upon the Elmira Water, Light & Railway Company the carrying out of the proposition which was submitted to the city several years ago of building a plant here, which would receive all of the natural gas obtainable from the Potter Gas Company or other sources, and supplement this supply by the manufacture of gas. If in the future the natural gas supply obtainable in this city became exhausted, the city would then be able to obtain manufactured gas from this plant, as is the case in a large number of cities where at the present time natural gas is not obtainable.

Gas Fuel for Melting Asphalt Increases Efficiency 40 Per Cent

The melting of asphalt with the use of gas is an experiment which is being successfully carried out by a plant in the West in the territory of the Public Service Company of Northern Illinois. The gas fuel is effecting an increase in efficiency amounting to more than 40 per cent, according to an announcement by the Public Service Company.

The process is to bring the mass in contact with hot oil. Ordinarily it is performed in a tank, which by reason of its severe duty, it is necessary to replace every year or two. A type of gas-fired boiler, in this instance designated as an absorber, is attached to the tank as an auxiliary.

"In this," the company explains, "the oil used is heated to the requisite temperature which, though comparatively high, is below the rather high flash point of this particular oil. Thence the heated fluid is conveyed to the tank of asphalt through pipes in such a manner as to reach immediately all of its contents. The work is quickened and various previous difficulties are entirely disposed of, all to an extent which amount to the increase in efficiency before mentioned."

The company announced that in another plant, also in the Western Division, utilization is made of the principle of heat exchanging in an annealing furnace whose fuel is gas supplied by the company.

"The furnace is a tunnel-like affair 30 ft. in length arranged so that the necessary heat treatment is administered in the middle third of the structure. Under the practice formerly followed a man at one end of the furnace placed the articles to be annealed on a conveyor, from which a man at the other end removed them. Another conveyor traveling in an opposite direction was installed. Now, the heat of a stream of articles emerging at either end is largely absorbed by cold articles placed on the conveyor moving the other way. This transferred heat is sufficient for the preheating necessary in the articles before their entrance into the zone of high temperature. Also, as will readily be seen, the capacity of the furnace is much increased."

American Natural Gas Company Leasing New Lands

The American Natural Gas Company's agents are rapidly leasing a large acreage of land in South Huntingdon township, Pa., which will be tested for natural gas. About one-half of South Huntingdon, it is claimed, will soon be producing gas, and several hundred farmers have already received attractive cash bonuses for leasing their lands.

Long - Landreth - Schneider Company Changes Its Name

On Jan. 1, 1920, the Long-Landreth-Schneider Company, of New Brunswick, N. J., changed its name to the Kompak Company.

The Kompak Company reports that the change is a change in name only, that there is no change in the personnel or management of the company. Also that the change to the shorter name has been done chiefly for convenience and to more clearly identify the company with the manufacture of its Kompak water heaters.

Efficiency Order Promulgated

A supplemental order made by the Oklahoma Corporation Commission takes up the old "efficiency service" order of the commission on use of gas of several years ago, and makes it mandatory on the part of gas distributing companies in the State of Oklahoma to make deductions in gas bills to consumers.

The previous order required gas companies to place pressure gauges on pipe lines and any time such pressure gauge showed less than four ounces, the company was compelled to report such to the commission.

In addition to this, the order requires the gas companies to make reductions in gas bills, according to the pressure as actually shown. If the pressure is less than four ounces and more than three, the bill must be only 75 per cent of the rate; less than three and more than two ounces, 50 per cent of the rates; if less than two and more than one ounce, 25 per cent of the rate, and less than one ounce is considered no service at all. It is further ordered by the commission that no customer is to be discontinued if he refuses to pay a gas bill when presented, where there is a controversy.

The "efficiency order" promulgated by the commission several years ago has been upheld by the Supreme Court.

Construction Notes

Easton Gas Works Improves Service

The Easton Gas Works, of Easton, Pa., has installed a governor in Phillipsburg, N. J., which enables the greater part of Phillipsburg to be fed by high pressure gas, greatly improving the service as well as enabling the company to discontinue the use of the gas holder at the old Phillipsburg plant. In using the holder during the winter months it was necessary to go to a considerable expense to keep it from freezing.

In operating, the saving made in one season by the discontinuance of the holder will be considerably more than the cost of installing the governor.

Two Miles of Larger Mains to Be Laid in Redding, Cal.

President Britton, of the Pacific Gas & Electric Company, has advised the local manager at the company's office in Redding, Cal., that $18,000 has been appropriated for enlarging and improving its gas service in Redding. Nearly two miles of new and larger mains are to be laid and the work of construction is to be undertaken right away.

Riverbend Company Installs $10,000 Compressor

R. K. Madsen, president of the Riverbend Gas & Water Company, announces that the company has completed installation of a $10,000 compressor at its gas plant in Dinuba, Cal. The compressor will insure a better pressure of gas in the local pipes and to the outlying territory the company serves.

Colony Company Laying Four Miles of Pipe Costing $25,000

Contractors have begun laying a 6-in. pipe line from the field of the Colony Oil & Gas Company, near Colony, Kans., to the Kansas Natural pipe lines, a distance of four miles. It is expected that by the middle of January the pipe line will be completed and a minimum of 2,000,000 cu. ft. of gas daily be drawn from the new field to supply consumers to the north of Colony. A. G. O. Matter, president of the Colony Company, says any of the three wells are already to hook on, and a fourth offset well to be completed before the line is opened will have a capacity of more than 2,000,000 cu. ft., so that the Kansas Natural will be in a position to get a considerable gas supply from the new field. Two other wells are digging besides the one almost completed.

The Colony company is building its own pipe line at an expenditure of $25,000, and has contracted with the Kansas Natural to sell its gas at 15 cents per 1,000.

Pacific G. & E. Dismantling Plant and Building $150,000 28-Mile Main

That an appeal from the trustees of the city of Woodland, Cal., that the gas plant operated here by the Pacific Gas & Electric Company be removed will be followed by the dismantling of the works is the statement in a letter received from John A. Britton, vice-president and general manager of the company. The letter also recites that a pipe from Sacramento to Woodland via Davis, Cal., will be laid for the purpose of delivering gas for consumption in Woodland from the company's Sacramento plant.

The letter sets forth that the pipe line will cost the company the sum of $150,000 or more. Work is to be commenced as early as convenient, but is dependent upon the time Eastern manufacturers can deliver the pipe.

Due to the expenditure of the company required under the plan, the letter says, the appeal for the added rate charge will have to be taken up with the California State Railroad Commission after the work is completed.

Oswego Plant Rebuilt

The Peoples Gas & Electric Company of Oswego, N. Y., has practically rebuilt its entire plant.

New purifier boxes, a washer box, boiler, booster, exhausters, condenser and tar extractor, have been installed in order that the manufacture of gas can be carried on in accordance with modern practice.

In addition the benches have been rebuilt from time to time to keep them at a high standard of efficiency. A new storage bin and coke crusher and conveyor have been installed, and a deep water well and an overhead tank now serve as a duplicate water supply and fire protection.

Many improvements have been made to the grounds and buildings and a five-story brick structure has been purchased and is now used as a storehouse and sub-station.

$1,000,000 Enlargement of the Natural Gas Plant of San Joaquin Company

In order to use some of the natural gas, now going to waste in the newly discovered gas field in the new Elk Hill oil territory of Kern County, Cal., for the generation of electricity to aid in coping with the power shortage existing throughout the San Joaquin Valley, A. G. Wishon, general manager of the San Joaquin Light & Power Corporation, has announced the immediate expenditure of $1,000,000 for the construction of an addition to its natural gas and oil burning steam plant in Bakersfield, Cal., that will double the size of the present huge plant and double its output of electric power.

This will enable the company to use natural gas entirely in the generation of electricity in this plant, completely eliminating the burning of crude oil which is now necessary to a certain extent, and reducing to a marked degree the high cost of steam generation from increased oil.

Work has already begun on the new plant, all materials have been ordered, and it will be complete and in full operation by the first of next May, in time for the spring pumping load. At the present time the big steam plant has an output of approximately 17,500 h.p. This will be increased to 35,000 h.p., making the plant the largest natural gas steam power plant in the West.

In order to transport the additional supply of natural gas, the Midway Gas Company is laying approximately 50 miles of 12-in. line from the Elk Hills to Bakersfield, which will have a daily carrying capacity of approximately 25,000,000 cu. ft. At the present time the Bakersfield steam plant is using the 6,000,000 cu. ft. capacity of a 6-in. line which was laid last summer connecting up with the Midway Gas Company line between the Kern County oilfields and Los Angeles, 26 miles south of Bakersfield, Cal.